



BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Subsidiary Diploma in Applied Science Pearson BTEC International Level 3 Foundation Diploma in Applied Science Pearson BTEC International Level 3 Diploma in Applied Science Pearson BTEC International Level 3 Extended Diploma in Applied Science Pearson BTEC International Level 3 Extended Diploma in Biomedical Science
Unit number and title	Unit 23: Materials Science
Learning aim	A: Understand the classification and properties of different materials.
Assignment title	Classification of materials
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	You are an apprentice materials science technician working for the global company 3M. Each year the company organises a competition for all of the apprentice scientists that it trains across the world. You are representing the UK division of 3M in the European heat and the successful winner will go on to a world final. The ultimate winner will be offered a sponsorship to cover the costs of studying for a degree in materials science. Your first task in the competition is to classify some unknown materials by testing their macro and microscopic properties. You will have to provide a report that uses your experimental data (primary and secondary) to justify what group you would classify each material into.
---------------------------------------	--

Task	Using your lesson notes and research you have carried out into materials and their properties, produce a report for the judging panel that includes: - The classification of three unknown materials on the basis of their macroscopic properties. Examine the macroscopic properties of each material (ie melting point, boiling point, strength, toughness, malleability, electrical and thermal conductivity, density and biodegradability) and from this determine the classification into one of the following groups: - metals and alloys - glass - polymers - ceramics - carbon allotropes - composites Present your findings (primary and secondary data) in a coherent results table and explain clearly your rationale behind your classification of each material into an
-------------	---



	appropriate group - The comparison of the microscopic structural features (ie atomic structure, bonding, additives, reinforcing fibres/particles) of: - Graphite compared to vulcanised rubber OR - Copper compared to polytetrafluoroethylene For your selected pair, explain how good their macroscopic properties as a lubricant and as a conductor of electricity are - The analysis of the microscopic and macroscopic structure of TWO unknown materials to classify them into groups according to their properties. You will be given X-ray diffractions, electron microscopy images, physical data and spectra of the bonding and atomic structure for two unknown materials. Use these to predict each material's macroscopic properties (ie melting point, boiling point, strength, toughness, malleability, electrical and thermal conductivity, density and biodegradability). Based on primary data, compare your predictions to the actual macroscopic properties of the materials.
Checklist of evidence required	A report which: - Determines of the classification of three unknown materials on the basis of their macroscopic properties; - Compares the microscopic properties of TWO materials to determine how good they are as a lubricant and at conducting electricity (examples of macroscopic properties); - The analysis of the microscopic and macroscopic structure of TWO unknown materials to classify them into groups according to their properties Sources of information must be appropriately referenced. Correct scientific terminology must be used.
Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria, you must show that you are able to:
A. D1	Analyse the microscopic and macroscopic structure of different given materials and classify them into groups according to their properties.
A.M1	Compare microscopic structures and classifications of different given materials to determine their macroscopic properties.
A. P1	Determine the classification of given materials by considering their properties.
Sources of information to support you with this Assignment	http://www.rsc.org/learn-chemistry/resource/res00001755/modelling-alloys-with-plasticine?cmpid=CMP00005265 https://www.stem.org.uk/elibrary/resource/27259 http://www.chm.bris.ac.uk/pt/harvey/gcse/covalent.html http://essentialchemicalindustry.org/polymers/polymers-an-overview.html



<http://pslc.ws/macrog/ptfe.htm>

<http://nptel.ac.in/courses/112107085/module2/lecture1/lecture1.pdf>

<https://www.khanacademy.org/test-prep/mcat/physical-sciences-practice/physical-sciences-practice-tut/e/elasticity-and-kinetics-of-vulcanized-rubber>

<http://ceramics.org/learn-about-ceramics/structure-and-properties-of-ceramics>

<http://www.nanoscienceworks.org/nanopedia/carbon-allotropes>

<http://www.explainthatstuff.com/composites.html>